

DEVELOPING A DIGITAL STORYTELLING-BASED LEARNING MODEL FOR TEACHING MATHEMATICS IN UZBEKISTAN'S INCLUSIVE SCHOOLS

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Abstract: This study presents the development and validation of a Digital Storytelling-Based Learning Model (DSLML) for teaching mathematics in Uzbek secondary schools, focusing on inclusive education contexts. The model integrates narrative-based visualization, cognitive learning theory, and digital technologies to improve students' comprehension, engagement, and retention of mathematical concepts. A quasi-experimental method was applied in two schools with 60 participants, including students with hearing impairments and neurotypical peers. The results demonstrate a significant improvement in learning motivation and problem-solving performance in the experimental group compared to the control group. The DSLML model offers a novel pedagogical framework that bridges emotional engagement and mathematical reasoning, aligning with UNESCO's vision of inclusive and technology-enhanced learning.

Keywords: digital storytelling, mathematics education, inclusive learning, cognitive engagement, Uzbekistan, ICT pedagogy.

1. Introduction

Mathematics education in Uzbekistan is undergoing a major transformation aligned with the Digital Education Strategy 2030, emphasizing inclusivity, technology integration, and student-centered learning. Despite progress in digital pedagogy, current methods often fail to engage students emotionally, especially those with cognitive or sensory differences. Digital storytelling (DST) offers a promising approach that combines visual, verbal, and emotional modes of learning, transforming abstract mathematical concepts into relatable, story-based contexts. While DST has been widely studied in Western contexts (Robin, 2016; Kearney, 2021; OECD, 2023), its application in Uzbekistan's multicultural and inclusive education environment remains unexplored. This study aims to design, implement, and validate a digital storytelling-based learning model (DSLML) tailored to Uzbek learners and evaluate its pedagogical effectiveness in mathematics classrooms.

2. Literature Review

Digital storytelling is rooted in Dual Coding Theory (Paivio, 1990), which posits that human cognition processes visual and verbal information through interconnected systems. In mathematics education, combining imagery, narrative, and emotion enhances cognitive retention and conceptual understanding (Sadik, 2008; Dogan, 2022). However, research in Central Asia, particularly Uzbekistan, reveals a gap in the localized adaptation of DST models. Studies by UNESCO (2022) and OECD (2023) emphasize that inclusive pedagogy in developing nations must align with cultural values, linguistic diversity, and technological accessibility. Therefore, this study situates the DSLML within Uzbekistan's socio-educational framework, offering both pedagogical innovation and contextual relevance.

3. Discussion

The DSLML model bridges cognitive and affective dimensions of learning mathematics. Story-based visuals helped students form concrete mental representations of abstract mathematical



symbols. This aligns with prior research (Miller & Kearney, 2020; Myklebust, 2021) emphasizing the power of narrative in conceptual learning. Moreover, the localized nature of the stories—featuring Uzbek culture, daily life, and national values—enhanced relatability and motivation. The findings support the integration of digital storytelling as an inclusive pedagogy within Uzbekistan’s educational reform agenda.

4. Conclusion

The proposed Digital Storytelling-Based Learning Model (DSLML) significantly improves student comprehension, motivation, and participation in mathematics lessons. The model aligns with UNESCO’s Inclusive Education Framework (2023) and can serve as a template for future digital pedagogy reforms in Uzbekistan. Further research should explore AI-assisted storytelling and mobile applications to expand accessibility and personalization.

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